THE EYES OF SCHOOL CHILDREN.

(Continued from page 407 December JOURNAL.)

Astigmatism—Test each eye separately with Pray's astigmatic chart.

With the normal eye the letters appear of equal distinctness and blackness.

If astigmatism be present, to any extent, certain letters will stand out sharp and black. Others will appear less distinct and more or less blurred. Ask the pupil which letters are blackest—stand out best. The lines of the letters, which are plainest, mark out the meridian of the eye which focuses the lines on the retina.

Astigmatism is very common, and the eye overcomes a small amount without trouble. Astigmatic eyes otherwise normal will not see details well at a distance. The leaves of trees will seem mingled together in a mass. The letters of books will tend to run together or seem indistinct in certain directions on the page, and stand out plainer at or near right angles.

Record astigmatism in school register in same column as visual fraction for right and left eye, as follows: 20/20 (a), the (a) meaning astigmatism.

Muscular Imbalance—A: Lateral deviation. (1) Esophoria. (2) Exorphoria.

Place the child 20 feet from a lighted candle. Hold a Maddox rod (piece of cardboard about 1½x1 inches with slit 1 inch long, 1-16 inch wide, in which is fixed a small glass rod, of uniform diameter) horizontally, in front of one of the eyes. The rod will change the candle light into a narrow vertical band.

The eye before which the rod is placed will see a narrow vertical band. The other eye will see the candle. With both eyes, if the muscular balance is normal, a vertical band of light will pass through the candle.

If there is muscular imbalance (lateral deviation) the vertical band of light will be either to the right or to the left of the candle.

1. Esophoria (eyes turned inward abnormally): When the band of light is upon the side of the candle indicated by the eye before which the rod is placed, using the words *right* and *left*.

2. Exophoria: When the band of light is upon opposite side.

A small amount of esophoria is to be looked for in the far-sighted eye, and is not a disadvantage. Exophoria, however, in connection with far-sightedness, is a matter of much concern.

B—Vertical deviation. Hold the Maddox rod in a vertical position in front of one eye.

If the muscular balance is normal a horizontal band of light will pass through the candle. If muscular imbalance exists, then the band of light will pass above or below the candle.

Record in the school register, blank column: Esophoria—Es. Exophoria—Ex. Vertical Deviation —V. D.

A combination of far-sightedness and exophoria or of near-sightedness and esophoria should receive immediate attention. The results are most serious. Several cases of this nature have come under the writer's observation within the past year, mostly in the grammar grades and in the high schools; cases where stuttering even has ceased upon the wearing of proper glasses and the exercising of the eye muscles.

Others, again, have stopped school, disregarded advice in this matter, and are yet spending all their nerve energy trying to see, and doing practically nothing else.

Color Blindness—No tests for color blindness are suggested at the present time. It may not be amiss to state those widely used.

1. The Holmgren Test. "The person is given a *test skein* of wool of *light-colored pink*, and told to select (not name) from a mass of similar skeins, those which most nearly resemble the skein to be matched. If he is color blind, he will confuse the grays, the greens, the pinks, the browns and the reds. As a confirmative test he is given a light, pure green to match in the same way."

2. The Railroad Test (Thompson Test). The apparatus used is a stick to which numerous bundles of yarn are attached, light green being used as a test skein. The yarns on the stick are numbered from 1 to 20, and are arranged in *alternate green* and confusion colors. The *odd numbers* are green; the *even*, confusion colors. The selection of 10 tints is required. If the person has a good color sense his record will exhibit none but odd numbers. If he is color blind, the mingling of even numbers shows this defect. A similar plan in schools is often followed, where teachers are interested, using colored paper slips.

Green-blindness and red-blindness are the common forms. There may be blindness to blue, yellow, red or green. To green-blind persons red and yellow are the same color, *both yellow*, of different degrees of brightness. Green also appears as a pale yellow with a gray or white band in its central part, while the violet end of the spectrum is seen as different shades of blue. The brightest part of the spectrum is the *yellow*. The red is a sort of darkened yellow. To the green-blind, red flowers and green leaves would both seem yellow.

To red-blind persons red and green are the same color, *both green*, of different degrees of brightness. Green is the brightest part of the spectrum. The violet end is seen blue, as in green-blind persons. A band of white or gray occurs in the far end of the green. To the red-blind, red and yellow flowers would both seem green.

HYGIENE.—Light. Type. Script. Board-Work.

Light—Proper and sufficient lighting of the school room is most important. The light should come from the left, or from the left and rear of the desk, and from a source above the children's heads. Coming from the right it produces shadows of the hands and arms; coming from the rear the pupil, himself, is in the road. Light from the front is the worst of all.

There should be at least one square foot of window space to each four or five feet of floor space. Where windows abound excessive light can be readily controlled.

Where the *sills* are *low*, window shades should be placed at the bottom as well as the top of the windows.

Type—

Size of the letters: Breadth is more important than height. Letters usually are one-third higher than broad. As a *standard* the short letters that occupy space, nearly square, are taken; for example, the letter n.

The smallest retinal image perceived at the most sensitive part of the retina, the macula, corresponds to a visual angle of five minutes (5′). For reading, print is held at the distance of distinct vision, 12 to 14 inches from the eyes. For the retinal image to be of the proper size for adults to read easily at this distance, the height of the letter n should be about 1½ mm. The distance between the lines 2½ mm. For children the types should be much larger and the leading also.

The following minimum heights of types for the different grades are the result of much recent careful experiment:

1st Year—Type, 2.6 mm. 1-10 of an inch. Leading, 4.5 mm. 1-5 to 1-6 inch.

2d and 3d Years—Type, 2 mm. 1-12 inch. Leading, 3.6 mm. 1-7 inch.

All grades above the Fourth—Type, 1.6 mm. 1-16 inch. Leading, 3 mm. ⅛ inch.

The metric values given are correct. The English equivalents are approximate changes. One millimeter (mm.) equals approximately 1-25 inch.

Larger type and wider leading is much easier upon the eyes.

Board-Work.—Charts. Taking the distance of distinct vision as 12 inches, it is easy to compute the size that letters or script should be at any given distance. Simply multiply the height of type given for books by the distance to the board (feet). These results are as follows: Board at distance of 30 feet.

1st Year—Non-loop script letters, 84 mm. 3 1-3 inches. Leading, 135 mm. 5½ inches.

2d and 3d Years—60 mm. 2½ inches. Leading, 120. 4 4-5 inches.

4th Year—54 mm. 2 1-6 inches. Leading, 108 mm. 4 1-3 inches.

5th Year and all other Grades—48 mm. 2 inches. Leading, 90 mm. 3 2-3 inches.

The metric values are correct. The English measures are approximate changes. Larger script is desirable.

Legibility of Type and Script—The letters of the alphabet are not all equally legible. In reading, the eye does not examine all part of each letter, but fixes its point of *clearest vision* along a *horizontal line* which cuts the *tops* of the *main parts* of the letters. The difference in the legibility of a sentence, the top or bottom half of which has been erased, is most marked. Reference is here made to an illustration given at the October Teachers' Meeting.

The line which the eye follows is dependent on the shape of each letter. By reason of the action of the eye in this regard, certain letters are confused with others; for example, h and b, I with l, g and a, a with s; c, e, and o are readily interchanged.

Children make mistakes by substituting one letter for another. It has been found by careful experiment that the most legible letters are: w, m, q, p, v, j and f; h, r, k, b, x, l, n and u are classed as fair; a, t, i, z, o, c, s and e are poor.

Letters are also more legible if the internal spaces are greater. The letters have a greater breadth. The strokes of the types should not be *thin* nor yet unduly *thick*. The areas of black and white ought to be as much in a mass as possible. An unduly thick stroke infringes on the open spaces of the letters.

The spacing between the letters should not be less than half the width of the letter itself.

The intervals between words should be sharply marked. A space of *not less* than *double the width* of the letters is a good working distance. A greater space may be advantageous for learners, but too great a space retards.

Reading is accomplished mainly by observing the differences in the shapes of the *upper parts* (main parts) of the letters. The best type marks those differences most clearly, separates the letters sharply from one another by the right spaces and marks well the intervals between the words. What is true for type is true for work at the board, save for the effect of irradiation.

Irradiation—Irradiation exerts some influence upon the legibility of letters. Because of irradiation a bright object on a dark background is seen larger than it really is. The stronger stimulation of the retina due to a bright object seems to spread out on the image of the retina.

An example of this is "the old moon in the new moon's arms." The part of the moon seen by "earth shine" always seems to be part of a smaller sphere than the bright part of the moon.

Again, hold a pencil across the flame of a lamp or a gas jet. The lead pencil appears very much smaller where it crosses the flame. The rays of the light from the flame are more intense than those from the pencil and affect a greater area of the retina.

The Effect of Irradiation on Type.—Because of the irradiation the white paper produces a rounding effect upon black letters, especially the corners. Some changes in type have been suggested in this regard, making letters *sharper angled*, and other changes making letters more open in form, etc.

On the blackboard, if the board were always black, the reverse would be true and the white letters would stand out sharp and clear. Unfortunately the board is not always black, but usually a grayish tint and the helpfulness of irradiation largely done away with, and the opposite effect results. For a similar reason the use of slates is condemned. Experiments have proved that the legibility of letters of equal size written on slates and on white paper with black ink is as 3 to 4.

Length of Lines—The length of lines ought to be such that the muscles of the eyes work right under right conditions in moving the eyes to and fro. The shorter the line the less fatigue it produces. Again, there is a change of accommodation as the eye passes from the middle to the end of the line.

The proper length is given for books at three inches. For copybooks at five and one-half inches.

The schools as a rule call for too much written work from pupils under ten or eleven years of age. As little reading and writing as possible should be given pupils under ten years. Up to nine or ten years of age the auditory memory is stronger than the visual memory. Children are ear-minded.

After about the tenth year the visual memory becomes the stronger and continues to develop more rapidly than the auditory throughout school life. Children are then more eye-minded than ear-minded.

Many other points suggest themselves in the hygiene of the eyes and the work of the school room as the child develops.

Excellent books which give the results of the latest and most careful experiments along this line, also the subject of School Hygiene as a whole, are the following: "Personal Hygiene," Pyle; "Physical Nature of the Child," Rowe; "School Hygiene," Hope & Brown; "School Hygiene," Shaw. These books are plain and direct in statement, not over-technical, and contain much that every teacher ought to apply continually in the school room.

Importance of the Work in School Hygiene; the physical balance of children; the eye as an illustration.—It is not intended in this leaflet to over emphasize the importance of correcting eye defects. The normal person can overcome defects in any direction to a greater or less extent and cannot afford to burden himself with spectacles or any other appendage which it is more trouble to take care of them to get on without. Merely this: In the normally developed and developing child the nerve centers controlling all organs of the body work in harmony. When one organ of the body is so far out of good working condition that this harmonious action of the nerve centers is interfered with, trouble (more or less of it) results all along the line. Working ability is injured; development is arrested to some extent.

The nerve centers controlling the eye are situated in the occipital lobes of the brain and are in the closest relation with those of speech, hearing, nutrition, circulation and others. The function of vision is vital to every act, emotion and thought. Vision is, therefore, most important in relation to complete development.

The physical balance of the child involves all other organs to a greater or less extent for each. When normal development is in action there should be present at different ages a certain degree of strength and endurance, certain vital capacity and motor ability.

The child's precision and accuracy, the development of his memory, all these are an index to his physical balance on the one hand and his development on the other.

This larger study of the child is of the highest interest and importance. In it all study of sense development and sense defects, and all other functions find their proper setting.

BY-LAWS.

(Proposed Constitution and By-Laws, continued from page 418, December JOURNAL.)

ARTICLE II.

MEETINGS.

SECTION 1. The annual meetings of this Society shall convene on the third Tuesday in April of each year.

SEC. 2. Special meetings of the House of Delegates may be called by the President upon the written request of at least twenty Delegates, provided that each Delegate is notified as to time, place and object of the proposed meeting.

SEC. 3. During the annual meeting of this Society, the general meeting shall convene each day at 9 A. M., and at such other times as it may, by resolution, determine, which times shall not conflict with the sessions of the House of Delegates. Section meetings may be provided for by the Committee of Arrangements. The House of Delegates shall meet each day at 8 P. M., or at such other time as will not conflict with the general meetings.

SEC. 4. The general meeting may recommend to the House of Delegates the appointment of committees or commissions for scientific investigation of special interest and importance to the profession and public.

ARTICLE III.

HOUSE OF DELEGATES.

SECTION 1. The House of Delegates shall be the legislative and fiscal body of the Medical Society of the State of California, and shall consist of delegates representing each component society.

SEC. 2. The House of Delegates shall meet at 8 P. M. on the first day of the annual session. It may adjourn from time to time as may be necessary to complete its business, provided, that its hours shall conflict as little as possible with the general meetings. The order of business shall be arranged as a separate section of the program.

SEC. 3. Each component county society shall be entitled to send to the House of Delegates each year one delegate for every 25 members, and one for each major fraction thereof, except in the event of reapportionment, as provided in Article IV, Section 8; but each component society which has made its annual report and paid its assessment as provided in this Constitution and By-Laws, shall be entitled to one delegate.

SEC. 4. Twenty-five delegates shall constitute a quorum.

SEC. 5. Delegates shall be elected for a term of two years, and those societies entitled to more than one representative are required to arrange such election so that one-half of their delegates, as near as may be, shall be elected each year.

SEC. 6. At the first annual meeting of this Society, after the adoption of this Constitution and By-Laws, the delegates of component societies entitled to only one delegate, shall draw lots to determine which half of the delegates shall hold for one year. Thereafter all delegates shall hold for two years, or until their successors are chosen.

SEC. 7. The House of Delegates shall approve all memorials and resolutions of whatever character issued in the name of the Medical Society of the State of California before the same shall become effective.

SEC. 8. The sessions of the House of Delegates shall be open to all members of this Society, but, except upon invitation they shall have no right to participate in its proceedings.

SEC. 9. It shall make careful inquiry into the condition of the profession of each county in the State, and shall have authority to adopt such methods as may be deemed most efficient for building up and increasing the interest in such county societies as already exist, and for organizing the profession in counties where societies do not exist. It shall especially and systematically endeavor to promote friendly intercourse among physicians of the same locality, and shall continue these efforts until every physician in every county of the State who can be made reputable has been brought under medical society influence.

SEC. 10. It shall have authority to appoint committees for special purposes from among members of the Society who are not members of the House of Delegates. Such committees shall report to the House of Delegates, and may be present and participate in the debate on their reports.

SEC. 11. It shall elect representatives to the House of Delegates of the American Medical Association in accordance with the Constitution and By-Laws of that body.

ARTICLE IV.

DUTIES OF OFFICERS.

SECTION 1. The President shall preside at all meetings of the Society and of the House of Delegates; shall appoint all committees not otherwise provided for; he shall deliver an annual address at such time as may be arranged, and perform such other duties as custom and parliamentary usage may require.

SEC. 2. The Vice-Presidents shall assist the President in the discharge of his duties. In the event of the President's death, resignation or removal, the Council shall select one of the Vice-Presidents to succeed him.

SEC. 3. The Secretary shall attend the general meetings of the Society and the meetings of the House of Delegates and of the Council, and shall keep minutes of their respective proceedings in separate record books. He shall be *ex-officio* Secretary of the Council. He shall be custodian of all record books and papers belonging to the Society, except such as properly belong to the Treasurer and the Editor, and shall keep account of and promptly turn over to the Treasurer all funds of the Society which come into his hands. He shall provide for the registration of the members and delegates at the Annual sessions. He shall, with the co-operation of the secretaries of the component societies, keep a card-index register of all the legal practitioners of the State by counties, noting on each his status in relation to his county society. He shall aid the Councilors in the organization and improvement of the county societies and in the extension of the power and usefulness of this Society. He shall conduct the official correspondence, notifying members of meetings, officers of their election and committees of their appointment and duties. He shall employ such assistants as may be ordered by the House of Delegates or the Council, and shall make an annual report to the House of Delegates. He shall supply each component society with the nec-